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BULLETIN

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Controlling the Pecan Case-Bearer

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The object of this circular is to give the best known methods of controlling the pecan leaf-case bearer and also to explain the habits and nature of this insect. Since this insect has been of importance during the last few years only, and while there is doubtless room for improving on present control methods, the methods outlined and explained in this circular are known to be effective in keeping down loss. They have been worked out by the government entomologists and succssfully practiced by a number of pecan men in southwest and southeast Georgia.

Formula.

1 pound powdered arsenate of lead
2 pounds unslacked lime
50 gallons of water.

Arsenate of lead comes in two forms, powdered and paste. If the paste be obtained use two pounds. In making up the formula, mix the arsenate of lead with a small quantity of water, pour and stir into the fifty gallons of water. Then slack the lime and strain into the water and arsenate of lead already mixed. Both arsenate of lead and lime have a tendency to settle to the bottom of the container and should be agitated before and during the application. In applying, effort should be made to get some of the mixture on every leaf. The last of August and the first of September is the best time for making the application.

Those who have not had experience in spraying trees or those who do not know the life-history of the case-bearer, should follow carefully the instructions given in this circular. The writer's observations bear out the statement that the most experienced orchardists are those who follow most carefully formulas and instructions. It does not follow that since one pound of powdered arsenate of lead to fifty gallons of water will do good against the case-bearer, that two pounds to the same amount will do twice the good, for in fact, it may do, and often does, considerable harm.

Extent and Severity of the Pecan Leaf Case-Bearer

In the principal pecan growing section along the Gulf of Mexico and Atlantic seaboard, the case-bearer has been doing considerable damage during the last few years. In Georgia, it is very prevalent in the southern tier of counties, from Brunswick to Bainbridge and northward. In the spring of 1916, it was doing considerable damage in the pecan orchards around Fitzgerald. As yet this insect has not been reported as far north in Georgia, as Macon.

Whether it will extend over the entire pecan growing section or not is problematical. In advancing into new territory, insects often escape, for a time at least, destruction from natural enemies, and furthermore, undergo changes so as to adapt themselves to new conditions. It may be that the case-bearer is being carried on trees shipped from infested nurseries into new territory.

The insect does its most serious damage in the spring. At that time the larvae feed upon the buds as they begin to swell and open. When the insects are as numerous as they have been during the past few seasons, by the time the trees should be in full foliage, the damage is sufficient to make the leaves look ragged or "moth eaten." Pecans bear their nuts on the season's growth; that is, the shoot that bears the cluster of pecans, grows the same year that the nut matures. The destruction, in the spring, of a small fruit bearing bud, therefore, means the cutting off of a cluster of nuts. Where the case-bearer is prevalent, many clusters are thus destroyed.

The trees apparently gradually recover from the effects by calling upon reserve buds to come into foliage, and by the middle of May, give the appearance of not having been damaged at all. These reserve buds, however, are not nut producing. Thus the most serious damage of the case-bearers is to the productivity of the trees. During the latter part of the summer they feed on the leaves. This lessens the vigor and growing power of the tree.

Life History of the Pecan Leaf Case-Bearer

There are four stages in the life of the case-bearer: egg, larva, pupa and adult. Moths lay the eggs on the leaves during May, June, July and probably August and September. The eggs hatch into very small worms which immediately begin to feed on the leaves, eating holes into them. Since, therefore, the larvae, or worms, feed on the leaves between the last of June and frost, it would seem possible to destroy them by spraying sometime during that period, with arsenate of lead. Experiments have proven this possible. Spraying should be early and so timed as to get most of the insects that are going to come out. It has been found by experiments that the time for making this one application is the last of August or the first of September.

How Larvae Hibernate

A few days before frost, the worms which have been feeding on the leaves, build cases to cover their soft bodies and each settles close to a dormant bud for the winter. From frost until the buds begin to swell in the spring, the case-covered larvae remain nestled close to dormant buds, almost of the same color as the buds, very small in size, consequently difficult to discover by man or natural enemies.

No method of killing the insects during the hibernating season has been discovered. However, it is likely that experiments will be made to discover solutions that will kill them at such times. The lime-sulphur solution which is used against the San Jose scale, or one of the misible oils, might do the work. But growers should be cautious about these materials until careful experiments have been made. It is expensive to spray pecan trees, and until the effectiveness of any material is accurately determined, it is better to stick to arsenate of lead sprayings. If the grower wishes to make such experiments, it would be advisable to do it on a small scale. If four trees are sprayed, four trees of the same variety must be left unsprayed, so that the merits of the work can be determined. The reason for taking trees of the same variety is that the case-bearer works with varying severity on different varieties.

Larvae Very Destructive in the Spring

At the opening of spring the larvae are very small, although they have lived half of the previous summer and all winter. But they begin feeding in the spring ravenously and grow rapidly. The young tender bud, close besides which they hibernated, furnishes abundant food without incurring dangers of travel. Spraying with a poison at this stage has not proven effective. This is due, no doubt, to the location of the larvae, their protective case and the protection afforded by the rapid growth of the unfolding buds. If the spraying is made just as the buds unfold, in a very few days the portions covered with the spray are left behind on the rapidly growing foliage, and the chances are that only a very small percentage of the worms would feed on the sprayed portion. On the other hand, if the spraying is delayed until the foliage has had time to fully develop, the damage has been done and the larvae have gone into the pupa stage.

The Pupa Stage. After the larvae have reached maturity, they prepare to pass into the pupal stage. The worms spin a silken cocoon which is attached to a folded leaf or to the twig from which the larvae had eaten the buds. This cocoon is about one inch long and can easily be located. By pinching off the end of the cocoon, the pupa can be seen in his resting quarters. From these cocoons the adult moths emerge. Natural enemies kill some of the case-bearers when they are in the pupal stage, but so far this destruction has not been sufficient to be of value. As stated, the moth emerges from the cocoon during June and July and probably a few hold over until August and September. Spraying will not kill these pupae as they do not feed and are difficult to get at with any contact insecticide.

The Adult Stage. The adult of the case-bearer is a moth which emerges from the cocoon and performs the important task of laying eggs. The moths, as such, are not injurious, but their importance comes from laying eggs which hatch into destructive worms, or larvae. There is no known method of fighting moths directly. It seems that birds gather a good many for food. Around towns where there are very few pecan trees it may be possible that birds will keep them in check. In the commercial sections, however, there are not sufficient birds to do this.

Spraying Machinery

The pecan grower who has ten acres or more of bearing trees will find it advisable to have a power outfit. In selecting power equipment, the following points are of value:

1. A tank that will hold a large quantity of water. A 200 gallon tank seems to be about the right size. It should be equipped with an agitator.
2. The pump should be of simple construction, so that all parts can be easily gotten to.
3. The engine is the most troublesome part of the power out-fit to get to do its work properly and constantly. Some of the points to be desired in a gasoline engine for a power outfit are: power to give a constant pressure of 200 pounds with some reserve power left; ability to stand hauling about the orchard without getting out of adjustment; and construction on simple lines.
4. Tank, pump, engine, wagon and a quantity of accessories are required. At least two leads of hose will be needed for each power outfit. The length of these will be determined by the size of the tree to be sprayed. If the trees are twenty-five feet high each lead will need to be about forty feet long. Cut-offs and extension rods are necessary. The cut-off is fitted into the extension just where the hose connects with the extension rod.
5. The nozzles must convert the flowing stream into a spreading mist. A good style of nozzle is a simple disk.
6. Another part of the outfit that is important is the pressure gage. To regulate the pressure, a valve is used in the return pipe. As the pump draws the material from the tank, all that does not pass through the nozzles returns to the tank. This regulator is doing good work when it can be set so as to give the same pressure whether the nozzles are working or cut-off.

For a few trees or a young orchard, a barrel spray pump will give good results if sufficient hand power is furnished and the operation is carried on slowly and thoroughly. There are many power sprayers and barrel pumps on the market.

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